Chromatic Dispersion Statistics of Different Data Sets

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Supporters

• Ryan Yu, Innolight
• John Johnson, Broadcom
• Chris Cole, Coherent
• Eric Maniloff, Ciena
• Nobuhiko Kikuchi, Hitachi
Updates since May Interim

• In June, ITU-T contribution “Summary for 2nd examination results of the statistical chromatic dispersion property” was circulated with additional chromatic dispersion data

• Included table with dispersion values for different wavelengths, confidence levels, and number of segments

• ITU data and data previous shared into IEEE show good agreement for multi-segment reaches (i.e. M=4, 99.9%, 10 km)

• Less agreement for single-segment reaches (M=1), though CD limits derived from the latest ITU-T dataset and this dataset are closer than before at M=1, Q=99% for FR4

• Contribution was made into ITU to propose possible reasons for this discrepancy.
  • Was confirmed in meeting that each participant in ITU-T study used raw data and did not treat zero dispersion wavelength and slope as independent variables

• Today I will show dispersion values for M=1 for FR and M=4 for LR for single distributions and mixture distributions
Review of data set previously presented

• This data set includes >2.5 million fiber spools
• Fibers compliant to ITU-T standards
  • G.652.D/G.657.A1
  • G.657.A2
• Fibers were shipped from 2013-2024
• Six manufacturers are included with factories in North America, Europe, and Asia (including China)
• This data set covers 64% and ITU-T data set covers 68% of market
Use distributions from each manufacturer to create a mixture distribution.
Look at tails for two scenarios (no curve fitting)

- Most extreme single distribution: Left tail of leftmost distribution and right tail of rightmost distribution (approach taken by ITU-T)
- Mixture distribution with equal weight: Combine all manufacturers with equal weight and look at left and right tail

Cartoon for illustration purposes
Not representative of data
800G-FR4
Data from left tail of leftmost distribution and from left tail of mixture distribution
800G-FR4
Data from right tail of rightmost distribution and from right tail of mixture distribution
**800G-LR4**

Data from right tail of rightmost distribution and from left tail of leftmost distribution

Look at right and left tails of mixture distribution

*Cartoon for illustration purposes*
*Not representative of data*
800G-LR4
Data from right tail of rightmost distribution and from left tail of leftmost distribution
Look at right and left tails of mixture distribution
Conclusion

• Dispersion results for FR wavelengths with M=1 and (2 km) and for LR wavelengths with M=4 and (10 km) presented with different probability (Q) values.

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